FINAL

RECOMMENDED REMEDIATION PLAN
AREA C

for

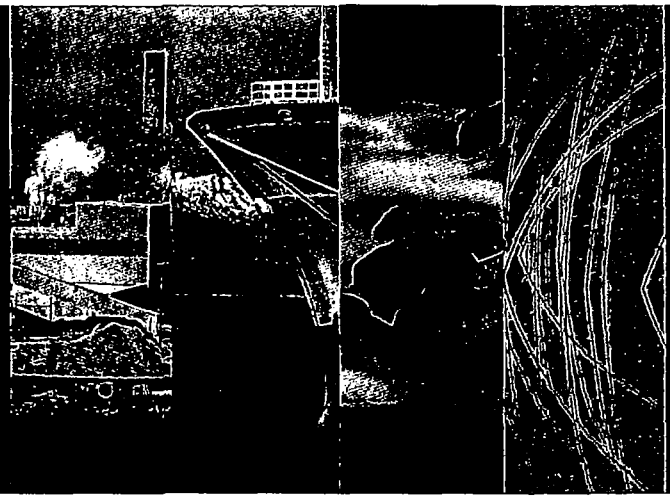
Middle Waterway Problem Area

of the

Commencement Bay Nearshore/Tideflats

Superfund Site

Tacoma, Washington



prepared for the:

Middle Waterway Action Committee

MIDDLE WATERWAY

Protecting the Environment, Promoting the Economy

November 24, 2000
(Revised April 9, 2001)

ANCHOR ENVIRONMENTAL, L.L.C.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

FINAL
RECOMMENDED REMEDIATION PLAN
AREA C
for
MIDDLE WATERWAY PROBLEM AREA
COMMENCEMENT BAY
NEARSHORE/TIDEFLATS SUPERFUND SITE
TACOMA, WASHINGTON

MIDDLE WATERWAY

Protecting the Environment, Promoting the Economy

Prepared for

Middle Waterway Action Committee

Prepared by

Anchor Environmental, L.L.C.
1411 Fourth Avenue, Suite 1210
Seattle, WA 98101

and

Foster Wheeler Environmental Corporation
12100 NE 195th Street, Suite 200
Bothell, WA 98011

November 24, 2000
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ACRONYMS AND ABBREVIATIONS

Anchor	Anchor Environmental, L.L.C.
AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirements
BA	Biological Assessment
CAD	Confined Aquatic Disposal
CBBA	Commencement Bay Biological Assessment
CB/NT	Commencement Bay Nearshore/Tideflats
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
City	City of Tacoma
cm	centimeter
COE	United States Army Corps of Engineers
cy	Cubic Yard
DNR	Washington Department of Natural Resources
Ecology	Washington Department of Ecology
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
ESD	Explanation of Significant Differences
Foss Maritime	Foss Maritime Company
Foster Wheeler	Foster Wheeler Environmental Corporation
HEA	Habitat Equivalency Analysis
MINI	Marine Industries Northwest, Inc.
MLLW	Mean Lower Low Water
MWBA	Middle Waterway Biological Assessment
MWAC	Middle Waterway Action Committee
NAD 83	North American Datum 1983
Plan	Recommended Remediation Plan, Area C (this document)
Pioneer	Pioneer Industries, Inc.
PRD/RD	Pre-Remedial Design/Remedial Design
PRP	Potentially Responsible Party
ROD	Record of Decision
Simpson	Simpson Tacoma Land Company
SMU	Sediment Management Units
SOW	Statement of Work
SQO	Sediment Quality Objective

SRAL	Sediment Remedial Action Level

1. INTRODUCTION

1.1 BACKGROUND

This Recommended Remedial Option Plan, Area C (Plan) was prepared as required by Section II.B.1.e and Section II.B.2.h of the Statement of Work (SOW), Appendix I to the Administrative Order on Consent (AOC) (United States Environmental Protection Agency [EPA] Docket No. 10-97-0096/Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA]) for the Pre-Remedial Design and Remedial Design (PRD/RD) Study of the Middle Waterway Problem Area of the Commencement Bay Nearshore/Tideflats (CB/NT) Superfund site. This Plan is a pre-design document identified in the EPA-approved Revised Final Pre-Remedial Design and Remedial Design Work Plan dated February 23, 1998 (Foster Wheeler Environmental Corporation [in this document known as Foster Wheeler] 1998a). Areas A and B are addressed in the Recommended Remediation Plan, Areas A and B (Anchor Environmental L.L.C. [Anchor] and Foster Wheeler 2000d).

This Recommended Remedial Option Plan is submitted on behalf of the Middle Waterway Action Committee (MWAC), currently consisting of Foss Maritime Company (Foss Maritime), Marine Industries Northwest, Inc. (MINI), and Pioneer Industries, Inc. (Pioneer).

1.2 PURPOSE AND SCOPE OF DOCUMENT

The purpose of this Plan is to recommend a remedial option for Areas A and B of the Middle Waterway to EPA for its consideration and approval. This Plan is based on the evaluation and comparative analysis of the options according to the nine CERCLA criteria provided in the Evaluation of Remedial Options Report (Anchor and Foster Wheeler 2001b).

The evaluation and selection of potential confined disposal sites have been completed by EPA and described in the final Explanation of Significant Differences (ESD) for the CB/NT Superfund site (EPA 2000b). The ESD identified the disposal sites for dredged problem sediments from the Middle, Thea Foss, Wheeler-Osgood, and Hylebos Waterways. EPA selected Blair Waterway Slip 1, St. Paul Waterway Nearshore Facility, and upland disposal sites to contain problem sediments dredged from these waterways. Combined disposal of sediments from the Middle Waterway with sediments from the Thea Foss and Wheeler-Osgood or Hylebos Waterways is a key objective of the Middle Waterway AOC and continues to be strongly supported by EPA, the resource agencies, and the general public. This report does not provide further evaluation of these disposal sites beyond a demonstration that combined disposal does not pose any significant issues.

1.3 SITE BACKGROUND INFORMATION

1.3.1 Site Description

The Middle Waterway lies between the Thea Foss Waterway to the southwest and the St. Paul Waterway to the northeast (Figure 1). The waterway has been divided into three areas:

- Area A – This area is characterized by water-dependent uses requiring maintenance of navigational depths and remedial options that take into consideration the integrity of existing structures, future development, and priority for water-dependent uses identified in applicable Coastal Zone Management Programs (e.g., City of Tacoma [City] shoreline program). Sediments that require remediation in this area will be addressed primarily through dredging. Foss Maritime leases aquatic lands from the State of Washington adjacent to the former Cooks Marine facility.
- Area B – This area is the central tideflat area and is the transition between Area A and Area C. Beyond the re-engineering of a bank and construction of the St. Paul Waterway Nearshore Facility habitat plan, the sediments in this area do not require remediation. Portions of Area B are part of the Washington Department of Natural Resources (DNR) aquatic reserve and the proposed St. Paul Waterway Nearshore Facility habitat plan.
- Area C – This area is the head of the waterway. This area is the focus of habitat restoration (e.g., Natural Resource Trustees' [Trustees'] Middle Waterway Shore Restoration, Middle Waterway Estuarine Natural Resources Restoration Project, and the DNR aquatic reserve). Due to Sediment Quality Objective (SQO) exceedences in the subsurface sediments, remedial technologies considered for this area must protect existing habitat by taking into account the potential for recontamination of Area A, Area B, and adjacent restoration projects during and avoiding disturbance to after construction.

The Round 1A Data Report (Foster Wheeler and Anchor 1999a), the Round 1B Data Report (Anchor and Foster Wheeler 2000a), and the Data Evaluation Report (Anchor and Foster Wheeler 2001a) present detailed descriptions of the waterway and should be reviewed for a detailed assessment of conditions within the waterway.

In September 1989, EPA issued the Record of Decision (ROD; EPA 1989) for remediation of sediments and source control in the nearshore and tideflat areas of Commencement Bay. The ROD contains several provisions that directly affect the selection and evaluation of remedial options for the Middle Waterway sediments.

For Middle Waterway sediments where chemical concentrations are below SQOs, no remedial action is necessary. Sediments containing chemicals at concentrations above the SQOs, but

similar to the sediment remedial action levels (SRALs), presented in the ROD may be appropriate for natural recovery. In this case, natural recovery processes are expected to reduce chemical concentrations to concentrations at or below the SQOs within the 10-year recovery period allowed in the ROD. The recovery period begins after sediment remedial actions are completed for areas that are not expected to recover naturally. The ROD anticipated that predictions of natural recovery represented by these preliminary SRALs may be modified depending on the results of more in-depth analysis of natural recovery. Section 9 of the Data Evaluation Report (Anchor and Foster Wheeler 2001a) presents a more in-depth evaluation of natural recovery.

Chapter 8 of the ROD analyzed ten alternatives (i.e., technologies) for remediation of sediments. Five of these alternatives, natural recovery and four confinement options, were determined to be potentially suitable for use in Commencement Bay.

The selected remedy, as described in Chapter 10 of the ROD, includes the following key components:

- Site use restrictions
- Source control
- Natural recovery
- Sediment remedial action
- Monitoring

The technologies identified in the ROD for confinement of contaminated sediments are Alternatives 3 through 6, listed below:

- Alternative 3 – In-Place Capping
- Alternative 4 – Removal with Confined Aquatic Disposal (CAD)
- Alternative 5 – Removal with Nearshore Disposal
- Alternative 6 – Removal with Upland Disposal

Natural recovery is not identified as a numbered alternative in the ROD. It is described as an acceptable option if all or part of a problem area is predicted to recover naturally within a 10-year period following control of major sources. Thin-layer capping (enhanced natural recovery), in which a thin layer (5 to 20 centimeters [cm]) of clean sediment is applied so that natural processes of mixing and ecosystem recovery can take place, is also an acceptable option for areas of the waterway that are not expected to recover naturally as identified in the final ESD (EPA 2000b). Therefore, natural recovery and enhanced natural recovery may be considered as a component of other alternatives to address marginally contaminated areas.

Treatment technologies were not considered cost-effective solutions at the time the ROD was issued. To determine whether that conclusion was still valid, EPA Region 10 asked EPA's National Risk Management Research Laboratory to review CB/NT data generated from the Middle, Thea Foss, Wheeler-Osgood, and Hylebos Waterways and to provide Region 10 with an opinion about the viability and cost-effectiveness of currently available treatment technologies.

They concluded that while some new technologies are available, most are in the pilot-study phase and are still not cost-effective (Appendix B of the Evaluation of Remedial Options Report [Anchor and Foster Wheeler 2001b]). Treatment technologies still work best on low-volume, high-concentration wastes rather than the large-volume, low-concentration wastes that characterize Commencement Bay problem sediments. Treatment is therefore not considered for the Middle Waterway.

1.3.2 Section 404(b)(1) Compliance

EPA has prepared a document to record its evaluation and findings regarding remedial actions in the CB/NT Superfund site pursuant to requirements of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. This Section 404 Compliance Evaluation document (EPA 2000a and Appendix E of the Data Evaluation Report) contains a summary of findings, an evaluation of compliance with the Section 404(b)(1) Guidelines [40 CFR 230.12(a)], and an evaluation of compliance with the public interest [33 CFR 320.4(a)]. The remedial actions covered by this document include dredging and capping in the Middle Waterway. For purposes of this document, the term capping includes enhanced natural recovery described in the July 2000 ESD. The Data Evaluation Report (Anchor and Foster Wheeler 2001a), the Evaluation of Remedial Options Report (Anchor and Foster Wheeler 2001b), the Recommended Remediation Plan, Area A and B (Anchor and Foster Wheeler 2001c), and this Recommended Remediation Plan, Area C provide all information necessary for EPA to amend the interim final 404 Compliance Evaluation document (EPA 2000a), as necessary.

1.3.3 401 Water Quality Certification Compliance

The Data Evaluation Report (Anchor and Foster Wheeler 2001a), the Evaluation of Remedial Options Report (Anchor and Foster Wheeler), the Recommended Remediation Plan, Area A and B (Anchor and Foster Wheeler 2001c), and this Recommended Remediation Plan, Area C, provide all information and surface water quality analyses necessary for EPA to assess the substantive requirements of the 401 Water Quality Certification. As discussed in Section 12 of the Data Evaluation Report (Anchor and Foster Wheeler 2001a), short-term water quality at the point of dredging is predicted to be in compliance with water quality criteria. The information is also available to assess the potential short-term and long-term water quality impacts associated with confined disposal. Once the disposal site for Middle Waterway sediments is identified and preliminary configurations are complete, MWAC will use the Middle Waterway contaminant mobility testing results to assess the potential for water quality impacts associated with the combined disposal site.

1.3.4 Disposal Sites

Since 1996, EPA has held several meetings and discussions with stakeholders of the CB/NT Superfund site, including potentially responsible parties (PRPs), representatives of federal, state, local and tribal governments, environmental groups, and members of the public, in an effort to identify potential disposal sites that meet the criteria set forth in the ROD (EPA 1989). Ten sites were identified during the process, although EPA further narrowed the list to a few candidate sites.

MWAC, in accordance with the AOC and SOW, submitted a Disposal Site and Mitigation Site Inventory to EPA (Foster Wheeler 1998b), which was subsequently approved by EPA in April 1998. Because EPA was in the process of preparing an ESD that would reflect the disposal site forum process and effectively select disposal sites, EPA has not required MWAC to prepare and submit a Ranking of Disposal Site deliverable.

In June 1999, EPA issued a fact sheet presenting its evaluation of disposal sites for the confinement of problem sediments dredged from the waterways of the CB/NT remaining to be remediated. EPA received comments on the fact sheet from various stakeholders.

In November 1999, EPA issued a draft ESD for the CB/NT Superfund site (EPA 1999) that incorporated comments received on the fact sheet. After the public comment period on the draft ESD closed, a group of four Hylebos Waterway PRPs, with EPA's support and participation, a public outreach process was initiated. This public outreach process consisted of a series of three workshop sessions. In response to the workshop's recommendations, EPA agreed to maximize the capacity of Blair Slip 1 and St. Paul Waterway Nearshore Facility disposal sites and allow the Hylebos PRPs to further develop an on-site upland disposal site.

Consequently, the final ESD (EPA 2000b) selects Blair Slip 1 and the St. Paul Waterway Nearshore Facility and disposal at an upland regional landfill as disposal sites to contain contaminated sediments dredged from the Middle Hylebos, and Thea Foss waterways. EPA will also consider an upland on-site fill as an alternative to disposal at an upland regional landfill.

Combined disposal of sediments that require removal is a key objective of the Middle Waterway AOC and continues to be strongly supported by EPA, the resource agencies, and the general public. Disposal of sediments from the Middle Waterway and the Thea Foss Waterway in the St. Paul Waterway Nearshore Facility or disposal of sediments from the Middle Waterway and the outer Hylebos Waterway, and the inner Hylebos Waterway in Blair Slip 1 should be a key objective of EPA's efforts.

1.3.5 Habitat Function and Endangered Species Act Compliance

Section 5 of the Data Evaluation Report (Anchor and Foster Wheeler 2001a) describes existing habitat conditions. The Evaluation of Remedial Options Report (Anchor and Foster Wheeler 2001b) discusses how various remedial alternatives would affect habitat functions (Section 4).

MWAC's recommended remediation alternatives are presented in the Recommended Remediation Plans (Anchor and Foster Wheeler 2001c and 2001d) and construction drawings and specifications will be developed in the design phase. The potential effects of the recommended remediation plans on threatened, endangered, and candidate species are analyzed in the Middle Waterway Biological Assessment (MWBA; Anchor and Foster Wheeler, 2001e). The MWBA is part of the larger Commencement Bay Biological Assessment (CBBA) authored by EPA in support of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 (Section 16 of the Data Evaluation Report). The MWBA assesses gains and losses of habitat function resulting from the recommended remedial alternatives, using the assessment of existing habitat as a basis.

Through the regulatory process and the documents mentioned above, there will be a clear delineation of the impacts caused by the remedial actions, including improvement in habitat function associated with the long-term improvement in habitat quality resulting from remediation of sediments that exceed the SQO. This delineation will provide a basis for defining any compensatory mitigation requirements. Those requirements will include mitigation for short-term impacts during implementation of the remediation plans balanced with restoration opportunities integrated into the remedial designs.

The impacts and benefits discussions in these reports are limited to the remedial actions in the Middle Waterway. Where the remediation plan involves dredging, the impacts and benefits associated with disposal of the dredge material are not discussed in the Middle Waterway deliverables. It is MWAC's expectation that a disposal fee associated with disposal in one of the two in-water sites selected by EPA (EPA 2000b) will address any compensatory mitigation requirements associated with the disposal site.

1.4 ORGANIZATION OF THIS DOCUMENT

The remainder of this Plan is organized into the following sections:

- Section 2. Summary of Recommended Remedial Option
- Section 3. Evaluation Summary of Recommended Remedial Option
- Section 4. References

Tables and figures, which are numbered sequentially according to their appearance in the text, are provided at the end of the text.

2. SUMMARY OF RECOMMENDED REMEDIAL OPTION

The AOC requires MWAC to develop comprehensive remedial options for the cleanup of the entire waterway. In the Evaluation of Remedial Options Report (Anchor and Foster Wheeler 2001b), a limited number of comprehensive remedial options for the Middle Waterway were developed and screened. Appropriate technologies were selected for each sediment management unit (SMU) (Figure 2) and then bundled to create a number of alternatives for each area of the waterway.

Three alternatives were created for Area C (Alternatives C-1, C-2, and C-3). The Evaluation of Remedial Options Report (Anchor and Foster Wheeler 2001b) combined the three alternatives together with two alternatives for Area A and one alternative for Area B, into the remedial options presented in Table 1. The no action alternative was not discussed further as a waterway-wide remedial option, although selected SMUs do not require further action, as summarized on Figure 2. The Evaluation of Remedial Options Report (Anchor and Foster Wheeler 2001b) selected Remedial Option 2, with Alternative C-1 as the preferred remedial option for Area C of the waterway. This portion of MWAC's recommended remedial options plan only addresses Area C.

2.1 DESCRIPTION OF ALTERNATIVE

This section describes the preferred alternative proposed for Area C (Alternative C-1).

2.1.1 Alternative C-1

Alternative C-1 includes enhanced natural recovery throughout SMUs 51a and 51b. The design of any additional input will avoid scour of sediments in Area C by considering location, flow velocities, and the use of soft engineering protocols (Schreffler and Thom 1993) similar to those used at the Trustees' Mowitch restoration project at the head of the Hylebos Waterway. Alternative C-1 also includes no action within SMUs 52a and 52b other than removing the pile of roofing material located at MW008-SP.

Due to the elevation of the tideflat, the limited size of floating equipment that could be used, the reluctance of contractors to allow their equipment to ground on the uneven tideflat surface, and the duration that the equipment would be able to float without grounding, the material may need to be placed from the shore. This will need to be further evaluated during the design phase.

The thin-layer of material placed in SMUs 51a and 51b would be approximately 15 cm thick. This thickness ensures that the surface sediments will remain will below the SQO long-term. Burrowing Shrimp, though present in intertidal habitats, are not expected to be an issue. Therefore, approximately 2,500 cy of capping material would be required. The distance of the

drainage channel that will require protection will be determined during the design phase. It is assumed that 400 feet (to centerline station 38+00, near station MW053) would be protected using soft engineering protocols.

3. EVALUATION SUMMARY OF RECOMMENDED REMEDIAL OPTION

The ROD (EPA 1989) evaluated the selected remedy against the nine CERCLA evaluation criteria as required by CERCLA guidance (EPA 1988). The Evaluation of Remedial Options Report (Anchor and Foster Wheeler 2001b) presented a detailed evaluation of the remedial options against those same criteria. This section briefly discusses the nine CERCLA criteria and summarizes the detailed evaluation of the Area C preferred option against these criteria.

The nine criteria are grouped into three classes based on whether they describe a required level of performance (threshold criteria), technical advantages and disadvantages (primary balancing criteria), or review and evaluation by other entities (modifying criteria):

- Threshold Criteria
  - Overall Protection of Human Health and the Environment
  - Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)
- Primary Balancing Criteria
  - Long Term Effectiveness and Permanence
  - Reduction of Toxicity, Mobility, or Volume Through Treatment
  - Short Term Effectiveness
  - Implementability
  - Cost
- Modifying Criteria
  - State and Tribal Acceptance
  - Community Acceptance

These criteria are defined below:

Overall Protection of Human Health and the Environment—Criterion provides a final check to assess whether each alternative provides adequate protection of human health and the environment.

Compliance with ARARs— Criterion is used to determine whether each alternative will meet all of its identified federal and state action-, chemical-, and location-specific ARARs (Appendix A of the Data Evaluation Report [Anchor and Foster Wheeler 2001a] and Evaluation of Remedial Options Report [Anchor and Foster Wheeler 2001b).

Long-Term Effectiveness and Permanence— Criterion addresses the results of a remedial action in terms of the risk remaining at the site to human health and the environment after response objectives have been met.

Reduction of Toxicity, Mobility, or Volume Through Treatment— Criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of problem chemicals as their

principal element. The ROD (EPA 1989) states that the reduction of toxicity, mobility, or volume through treatment of contaminants is not applicable to the technologies described for Alternative C-1 in Section 2. The reduction of toxicity, mobility, or volume through treatment is therefore not discussed further in this Plan.

Short-Term Effectiveness— Criterion addresses the effects of the alternative during the construction and implementation phase of the project.

Implementability— Criterion addresses the technical and administrative feasibility of implementing the alternative and the availability of various services and materials required during its implementation.

Cost— Criterion evaluates the cost of constructing, operating, and maintaining an alternative. Cost estimates should be refined to provide a feasibility study-level estimate with an accuracy of +50 percent to –30 percent.

State and Tribal Acceptance— Criterion addresses technical and administrative issues and concerns that the state and tribes may have regarding each of the alternatives.

Community Acceptance— Criterion addresses the concerns that the public may have regarding each of the alternatives.

In this section, the alternative that makes up the Recommended Remedial Option (Remedial Option 2; Alternative C-1) is compared to the nine CERCLA criteria.

3.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative C-1 will be protective of human health and the environment by placing a thin layer of clean material (15 cm thick) throughout SMU 51a and SMU 51b.

Enhanced natural recovery modeling of this area is discussed in the Data Evaluation Report (Anchor and Foster Wheeler 2001a). This modeling predicts that all chemicals that currently exceed SQOs in the surface sediments will be reduced to concentrations less than the SQOs through mixing and bioturbation. Because the 15 cm of clean material includes a significant safety factor (only 10 cm is required to reduce surface below the maximum detected concentrations) and mixing of subsurface sediments reaches a steady state concentration well below the SQO, this remedy is protective. The addition of amended, clean, sands will reduce chemical stress on the aquatic invertebrate population and allow a healthier population to develop. Burrowing Shrimp are not expected to be an issue. Use of a thin layer of material is intended to prevent smothering the existing benthic and epibenthic organisms and to facilitate their colonization of the new cover material. The biologically active zone is generally regarded to

be the top 0 to 10 cm of sediment (EPA 1997b), so the thinner the cover material, the more quickly bioturbation and recolonization will occur. Supplementing the existing fine-grained sediments with sand may shift the composition of the invertebrate population, but the high organic content (amendment) would likely facilitate recolonization. Full recovery in thin capped areas would be expected to be complete within 1 year.

The pile of roofing material located in SMU 52a (MW008-SP) would be removed, improving substrate availability.

3.2 COMPLIANCE WITH ARARS

Alternative C-1 complies with the ARARs presented in Appendix A of the Data Evaluation Report (Anchor and Foster Wheeler 2001a) and the Evaluation of Remedial Options Report (Anchor and Foster Wheeler 2001b). All the information exists for EPA to ensure that all substantive requirements of these regulations will be adhered to.

3.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

This alternative will provide long-term effectiveness by reducing surface sediment chemical concentrations within SMU 51a and SMU 51b to levels below the SQO. With source control in place and proper erosion control measures, this will provide a permanent remedy for the existing surficial problem sediments. Problem sediments located at depth would not be remediated but would not be biologically available. Further, enhanced natural recovery is based on an initial placement of clean material and mixing over time. Steady state conditions are reached when the finite mass of chemicals within the mixing depth are fully mixed with the clean material. Consequently, cap life is not finite and the bioactivity active zone will be well below the SQO over time. Observations of the area after the construction of the Middle Waterway Estuarine Natural Resources Restoration Project and modeling performed during the design phase (if required) will determine whether there is potential for the area to be eroded. Protection of the dendritic channels would be performed to prevent erosion, if required. Coupled with the benefits provided by the cleanup, the actions in these SMUs will not significantly alter existing habitat elevations and will result in a net benefit to habitat function.

The channel from Outfall 200 will be protected to ensure that it will not meander and, therefore, will provide a long-term remedy for the potential of subsurface sediments in Area C to be exposed by erosional forces from the outfall. The surface sediments in SMUs 51a and 51b will have contaminant concentrations reduced with the application of the thin layer of clean material. The application of the clean material will augment the low natural sedimentation rate by introducing clean sand. Natural processes, primarily bioturbation, will mix the sand with the underlying material and thereby reduce chemical concentrations in the biologically active zone and reduce associated adverse effects, without destroying the existing benthic community. The

sediments in Area C (and the entire tideflat) are fine-grained, cohesive sediments that do not readily migrate, as evidenced by the similar location of dendritic channels in all the aerial photographs from 1946 to present. It is anticipated that this situation will remain and that the remediated sediments in SMU 51b will not migrate and expose any subsurface SQO exceedences, though soft engineering protocols (Schreffler and Thom 1993) may be required to ensure this situation. The cleanup of sediments in the Middle Waterway will result in eliminating exposure to existing contaminants, and will provide improved intertidal habitat conditions. Coupled with the benefits provided by the cleanup, the proposed actions, if the Middle Waterway was viewed as a stand-alone cleanup project, would result in a net benefit to habitat.

3.4 SHORT-TERM EFFECTIVENESS

Alternative C-1 will present a low risk to the public, because no public access would be allowed to the construction area. No sediments will be excavated (or dredged) or handled, so risks to the public and workers associated with a release will be very small. Water quality (turbidity and low dissolved oxygen) is not expected to be an issue since construction will likely occur in the dry. Possible short-term impacts include a temporary degradation of water quality that may occur during periods shortly after placement of the thin layer of clean material. Given the present status of the waterway, these short-term impacts are negligible, and shall be minimized through use of best management practices during remediation. Health and safety monitoring will be initially performed to ensure that workers are protected during operations. If the thin layer of clean material is placed from the land, equipment may need to be driven across the tideflat. Low ground pressure equipment, steel plates, or tire mats could be placed on the tideflat to ensure that the equipment does not get mired in the mud and caught by the rising tide, endangering the equipment and personnel. Heavy-duty blowers could be used to apply the thin layer of clean material, which would reduce the amount of tideflat that would be disturbed. Work would take place outside the period juvenile salmonids would be migrating through the area.

3.5 IMPLEMENTABILITY

This alternative is readily implementable. Construction equipment to deliver, place, and spread a thin layer of clean material (dump trucks, loaders, dozers, blowers, etc.) and the required ancillary equipment are locally available. Local contractors are experienced in performing this type of task. This portion of the tideflat is very soft, and construction equipment will sink into soft intertidal sediments. However, low ground pressure equipment could be utilized. If required, steel plates or similar devices could be used to distribute the weight of the equipment over a larger area. Heavy-duty blowers could be used to apply the thin layer of clean material, which would reduce the amount of tideflat that would be disturbed.

3.6 COST

The estimated cost for this alternative is $192,000. This preliminary cost estimate is detailed in Table 2.

3.7 STATE AND TRIBAL ACCEPTANCE

This draft Recommended Remediation Plan addresses the comments compiled by EPA dated October 5, 2000 and February 20, 2001 (Appendix C). It is expected that state and tribal concerns have been addressed regarding Alternative C-1.

3.8 COMMUNITY ACCEPTANCE

The public comment period on EPA's Middle Waterway ESD will extend over 30 days, during which the public will be asked to provide their evaluation and advice and to raise any concerns they have regarding MWAC's recommended remediation plan or EPA's proposed plan, if different. The community's concerns regarding any of the alternatives cannot be addressed until after the public comment period.

3.9 RECOMMENDED ALTERNATIVE

The recommended alternative for Area C is shown on Figure 3.

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Table 1. Assembly of Alternatives into Remedial Options

Remedial Option	Alternative					
	A-1	A-2	B-1	C-1	C-2	C-3
1	•		•	•		
2		•	•	•		
3	•		•		•	
4		•	•		•	
5	•		•			•
6		•	•			•

Table 2. Cost Estimate for Alternative C-1

		Alternative C-1		
Item	Unit	Unit Cost	Quantity	Extended Costs
Mobilization/Demobilization	LS	$ 10,000	1	$ 10,000
Dredge and Transport	CY	$ 9.60		$ -
Rehandling	CY	$ 3.00		$ -
Aquatic Disposal	CY	$ 40		$ -
Thick Cap (Sand)				$ -
Purchase and Deliver	Ton	$ 7.75		$ -
Place	Ton	$ 6.25		$ -
Thin Cap (sand)				$ -
Purchase and Deliver	Ton	$ 7.75	3,500	$ 27,125
Place	Ton	$ 6.25	3,500	$ 21,875
Shore Protection				$ -
Purchase and Deliver	Ton	$ 10.25	250	$ 2,563
Place	Ton	$ 6.25	250	$ 1,563
Habitat Mitigation	LS	TBD	1	$ -
Subtotal				$ 63,125
Engineering Design	Percent	10%		$ 6,313
Const. Monitoring/Mgmt.	Percent	5%		$ 3,156
Long Term Monitoring	LS	$ 100,000	1	$ 100,000
Contingency	Percent	30%		$ 18,938
Total				$ 191,531

Assumptions: Habitat Mitigation costs to be determined.
Removal of the pile of roofing material at MW008-SP is considered negligible.
Prices for sand, gravel, and shore protection material from LoneStar Industries
Long-Term monitoring based on $25,000 per event; one event every 2 years; i = 7%; e = 3%
Long-term monitoring does not include monitoring at disposal site.
Long-term monitoring at the disposal facility is included in the aquatic disposal unit cost.
This cost estimate is in present day (2000) dollars.

Notes: CY = Cubic Yard
LS = Lump Sum
SF = Square Foot
TBD = To Be Determined

ST. PAUL WATERWAY

MIDDLE WATERWAY

A

B

MIDDLE WATERWAY ST

E 11th ST

SIMPSON TACOMA LAND COMPANY
(SIMPSON TACOMA KRAFT CO.)

ABANDONED WOODEN BARGES AND VESSELS

DRYDOCK (TYPICAL)

SCOW SHED

PALMER CREEK

RETAINING WALL

COOK'S MARINE AREA

FOSS MARITIME CO.

MARINE INDUSTRIES NW, INC.
(LEASED FROM FOSS MARITIME CO.)

GENERAL CONSTRUCTION
(LEASED FROM FOSS MARITIME CO.)

MYLET FAMILY LP II
(COASTCRAFT, INC.)

CITY OF TACOMA

TACOMA PUBLIC UTILITIES

DNR

PACIFIC YACHT BASIN INC.

CITY OF TACOMA FIRE STATION #6

E 'F' ST

PIONEER PAINTS, INC.
(SUB-LEASED FROM MARINE INDUSTRIES NW, INC.)

PUGET SOUND PLYWOOD

E 3rd ST

FORMERLY LEASED TO
CARLYLE TRUCKING
(FOSS MARITIME CO.)

E 7th ST

E 'E' ST

COMMENCEMENT BAY

Project Area

GOVERNMENT PIERHEAD LINE

THEA FOSS WATERWAY

0 300

Scale in Feet

NOTES:

Property line information has been compiled from multiple data sources, which have not been verified. These data are to be used for reference purposes only.

Horizontal Datum: WA State Plane South Zone (NAD83)
Vertical Datum: COE Mean Lower Low Water

Legend

Existing Tidal Channel Bottom

Existing Side Channels

Figure 1
Middle Waterway Problem Area
Vicinity and Site Map

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FOSTER WHEELER

MIDDLE WATERWAY
Protecting the Environment. Promoting the Economy

MWWP1FG01.dwg 08/12/00

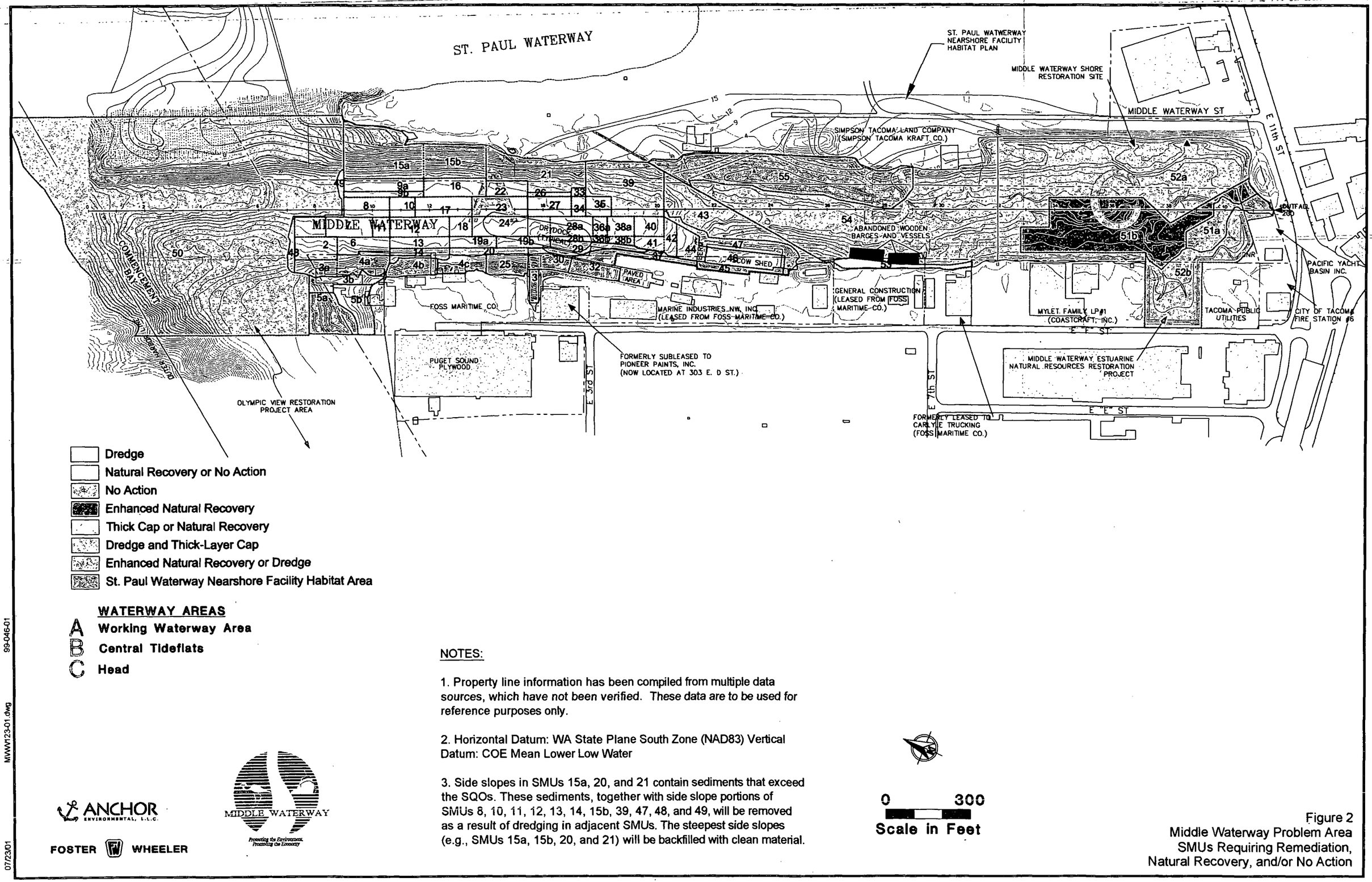
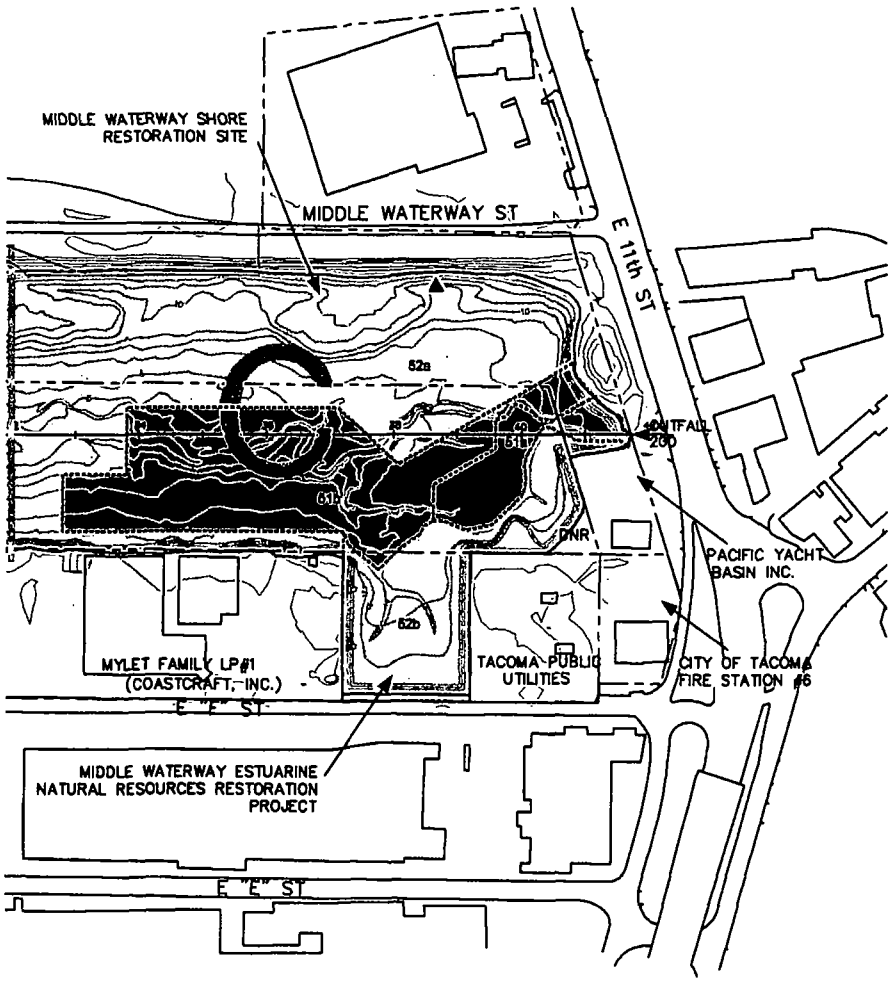


Figure 2
Middle Waterway Problem Area
SMUs Requiring Remediation,
Natural Recovery, and/or No Action



0 300

Scale in Feet

No Action

Enhanced Natural Recovery

NOTES:

1. Property line information has been compiled from multiple data sources, which have not been verified. These data are to be used for reference purposes only.

2. Horizontal Datum: WA State Plane South Zone (NAD83)
Vertical Datum: COE Mean Lower Low Water

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Figure 3
Middle Waterway Problem Area
Recommended Remediation Plan, Area C

MWESD 5.3.1 Doc# 050733